



Duncan Campbell Vice President, Project Analysis

HOMER MICROGRID AND
HYBRID POWER

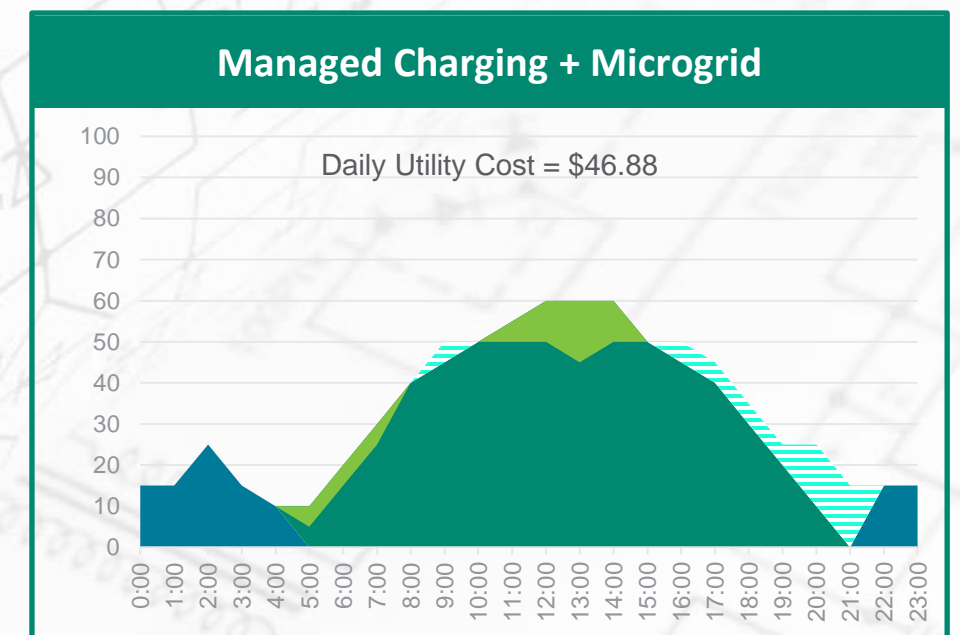
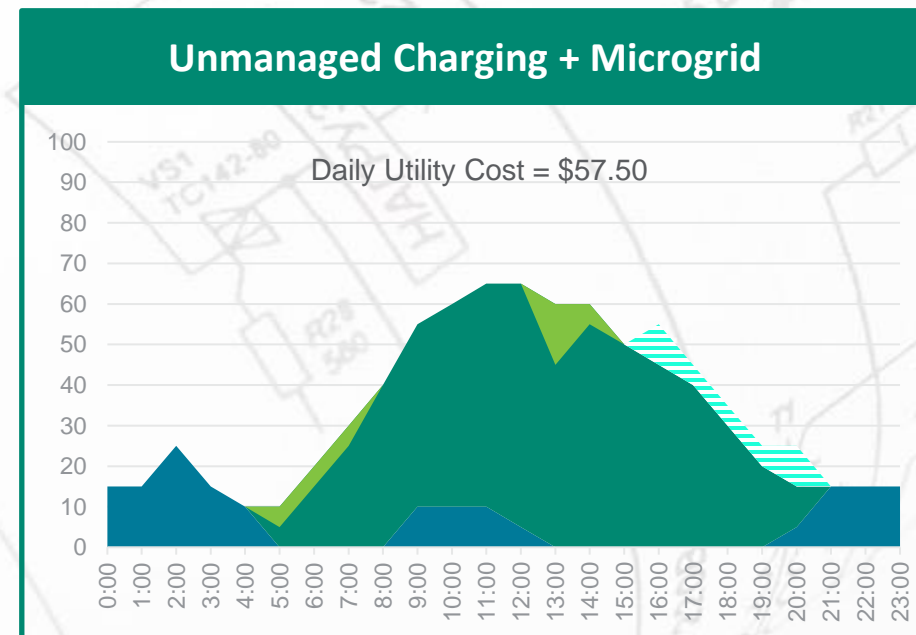
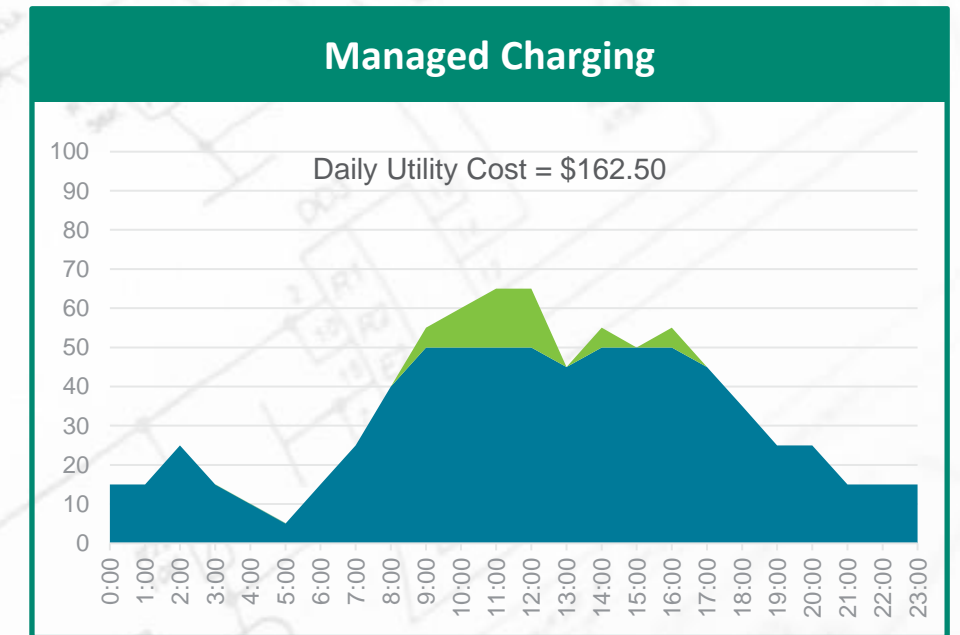
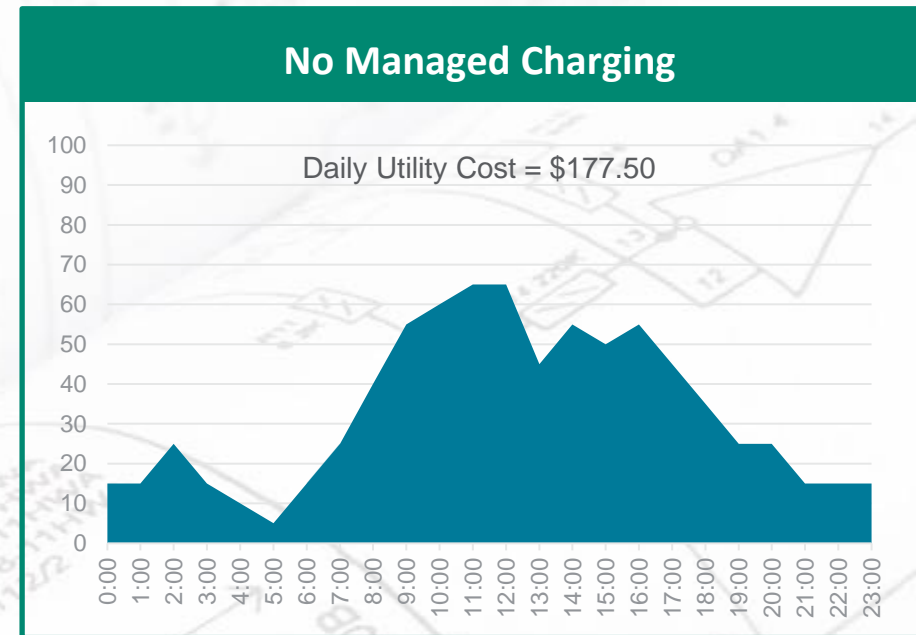
UL | 9TH ANNUAL | INTERNATIONAL

Designing Infrastructure to Suit Phased Electrification

- Comprehensive planning of power system allows for intelligent phasing of electrification
- Ex: 5 trucks this year, 10 next year, 15 the following requires careful may require sufficient power infrastructure in year 1 for all phases
- Another option would be to install switchboard with appropriate bus size but leave prepared spaces for new EV load breakers
- Whereas at other times, you might bring in the right size service, but split the switchboard into several chunks.

Charging flexibility and cost reduction by adding DERs

- Adding dispatchable DERs (ex: battery storage) creates operational flexibility
- Without DERs, managed charging is your only means of controlling EV charging costs
- Adding DERs offers and enhances the benefits of managed charging but with less strict charging schedules/rules



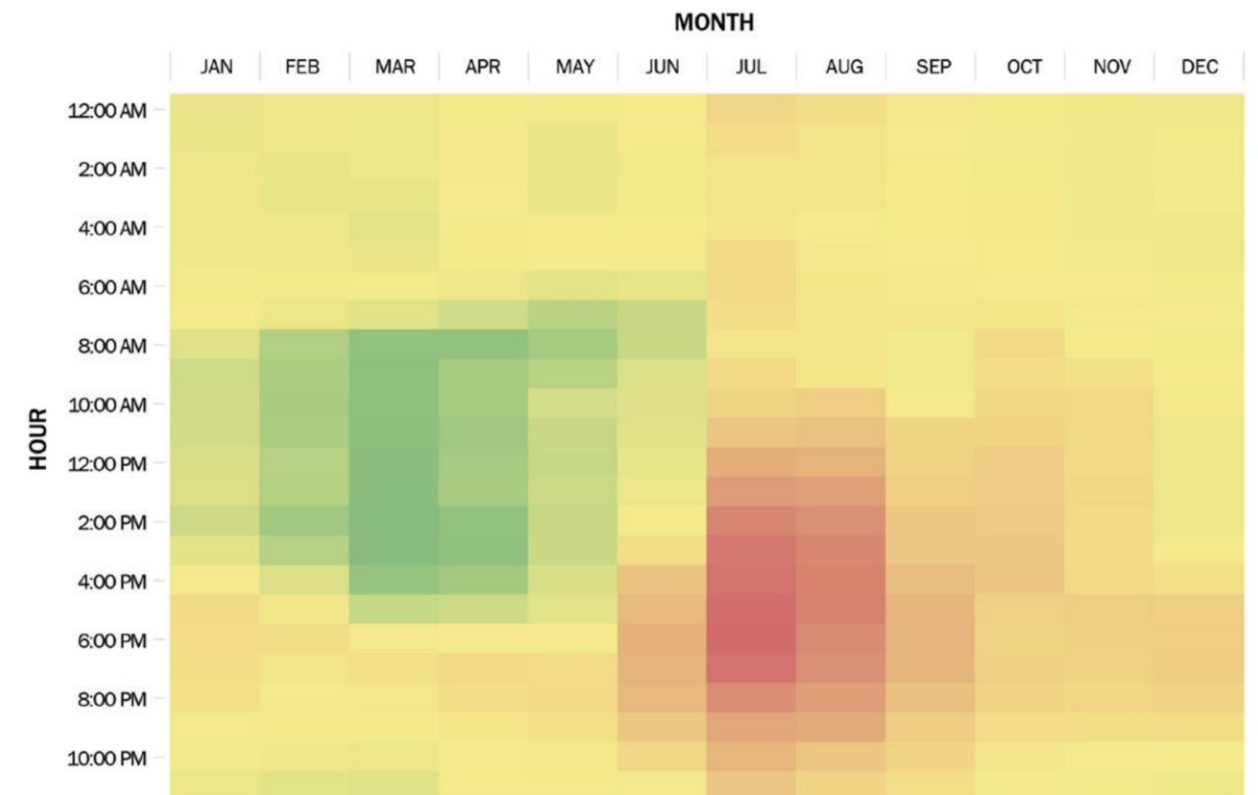
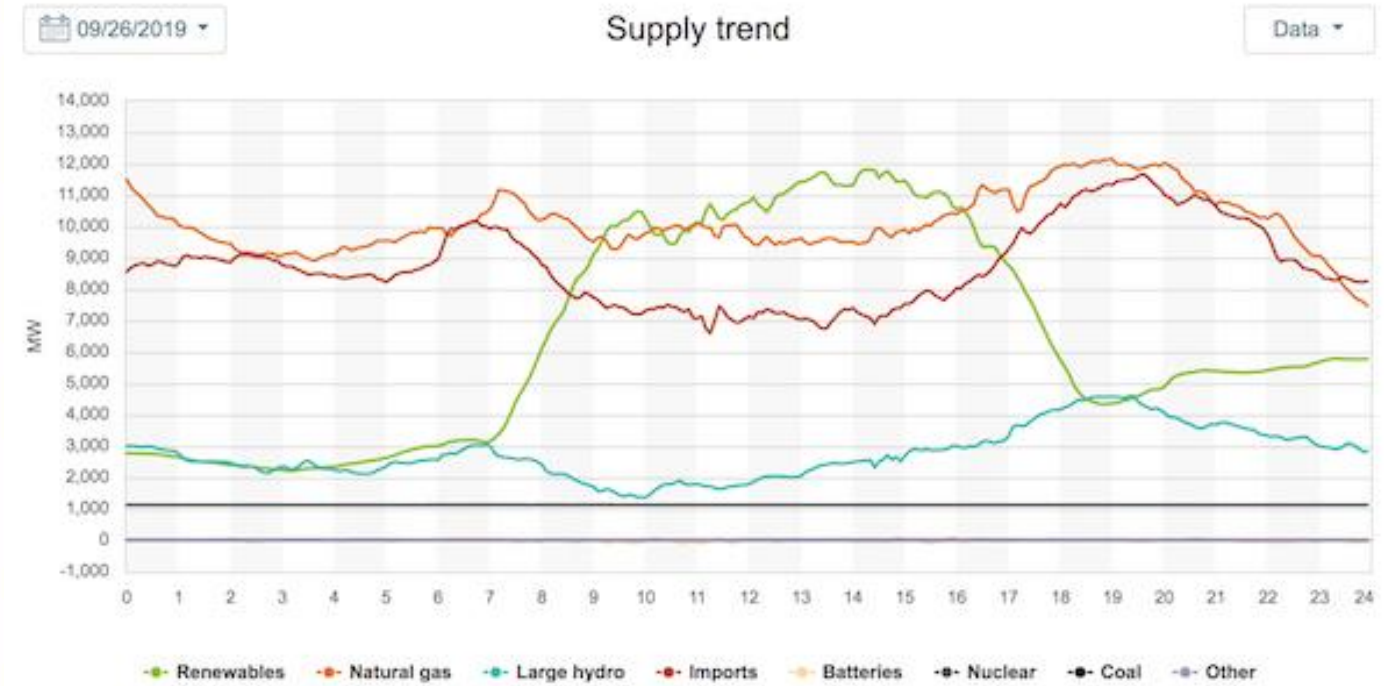


Microgrids offer vital resilience to fleets

- Many fleets currently have a large diesel tank and pump in their parking lot
- Fuel security = revenue security
- Electrification moves responsibility of fuel security from fleet to utility
- Microgrids can help fleet owners regain this fuel and revenue security, de-risking the EV transition
- The same DERs that are offering charging flexibility can offer resilience, making for more economic resilience than a typical diesel backup generator
- Stationary battery storage is well suited to the fast response required by instantaneous EV charging loads
- Resilience options with or without backup diesel generators are viable
- Microgrid DERs, controls, and switchboards allow for very flexible vehicle-to-load operations

Microgrids Improve Sustainability of Fleet Electrification

- On-site solar generation
 - typically 20-50% of annual fleet electricity needs are directly decarbonized
 - no T&D losses
- Demand Management & Grid Services
 - reduced grid's need to dispatch inefficient and polluting peaker plants
- Cleaner Resilience
 - during outages, can run cleaner than diesel generators



Economic Impact of Adding Microgrids to EV Charging

- Reduced electricity input costs
 - Solar kWh behind the meter
 - Peak demand management
 - TOU arbitrage
 - Increased LCFS value
- Grid Services
 - Demand response
 - VPPs
- Optimized infrastructure/capacity costs
- Revenue protection and transition de-risking via resilience
- Predictable opex + hedge against changing tariffs



Financed Solutions for Fleet Electrification with Microgrids

- What does Energy-as-a-Service for EV Charging Microgrids include?
 - Zero Capex or O&M cost
 - Incoming utility service
 - Smart switchboard and controls
 - Power distribution to chargers
 - EV Chargers
 - Microgrid: solar, station battery storage, backup generation
 - Charging management software, DER optimization, grid-services
 - Design, Permitting, Interconnection
 - On-going operations and maintenance
- Reducing Risk
 - Technology risk - managed by EaaS provider
 - Project risk - turning a parking lot into a sophisticated power distribution center isn't simple
- Aligned Incentives
 - Your EaaS partner wants the fleet electrification program to succeed and grow
 - This is important, as this projects are always going to be phased in over time
- Simplicity & Speed
 - Industry's value chain is still immature and very fragmented
 - Typically need to manage up to 10 different partners, whereas with EaaS you have one partner
 - EaaS provider has done much of the work already, not starting from square one on every project



THANK YOU.

SCALE
MICROGRID SOLUTIONS

The views and opinions expressed in this work are those of the author's and do not represent the official position of UL.



HOMER MICROGRID AND
HYBRID POWER

9TH ANNUAL
INTERNATIONAL